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ABSTRACT

This paper discusses the philosophy of systems and systems thinking, considers some systems theories, and presents a conceptual model that represents the progression from systems theory to methodology and the implementation of synthesized theories. Following this discussion, the author examines the task of using a systems approach to develop and implement improved participative planning and decision-making procedures for a turbulent school district. Separate short sections of the paper focus in turn on the philosophy of systems thinking, synthesis of systems theories, progression from theory to methodology, systems thinking as applied to participative planning, and the impact of operational and environmental conditions on a systems approach. (JG)

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A SYSTEMS APPROACH TO EDUCATIONAL MANAGEMENT

BY

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APRIL, 1976

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"A Systems Approach to Educational Management" — A Research Paper

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A SYSTEMS APPROACH TO EDUCATIONAL MANAGEMENT

I - Philosophy of Systems Thinking

Man has searched for an understanding of life and various modern civilizations have seen a progression of change. The philosophers have written and expounded a variety of perceptions of reality and today a newer and different philosophy is in the embryonic stages - systems thinking is a descriptive term applied to this latest philosophy.

However, before proceeding to attempt to understand systems thinking and then to seek a pragmatic example of systemic planning, it is desirable to briefly discuss the antecedents and derivation of this newer mental construct. It has been postulated that the period from the Renaissance to roughly mid-twentieth century, man has been machine-oriented, resulting in an analytical approach to life. During this span of some six hundred years, science, engineering and technology have dominated man's search for knowledge and truth and a time may now have been reached when all that is to be dissected has been scrutinized and recorded. The question increasingly arises whether with this increased knowledge there is really a finer and improved perception of reality - the understanding of life.

When Sadi Carnot in 1824 theorized about thermodynamics in his search for better utilization of steam generated energy, he explained in his second law of thermodynamics that a system moves toward equilibrium; it tends to run down, that is its

differentiated structures tend to move toward dissolution as the elements composing them become arranged in random disorder; this is known as entropy. This theory originally developed to explain mechanistic reality, has been interpreted as applying to all systems, and human organizations are systems. During this nineteenth century period, the theory of evolution developed and influenced scientific and philosophic thought. Now the philosophers in understanding life recognized the maintenance of an orderly process and the desirability of designing a systematic approach to solving problems, but that entropy or a wearing away of all matter indicated a constant and natural decline of structure. This recognition of the reality brought a concern for control of the life process and a search for alternatives.

Thought then turned to systems as an alternative explanation and possible solution; system in this context meaning the design of something that reduces entropy and emphasizes evolution, or the constancy and continuation of structure and organization. Design is a term used here to describe an activity which gives meaning to evolution. The recognition existed that there was a need to design systems to understand the evolutionary process. This thinking led to later consideration of open systems versus closed systems and the equifinality of systems development.

II - A Synthesis of Systems Theories

The most modern thought of designing systems, introduced by the Belgian biologist, L. von Bertalanffy, made a relationship between open systems and the natural sciences. In the 1950's von Bertalanffy published "The Theory of Open Systems in Physics and Biology" which described some general characteristics of open systems. In this work he stated that some peculiarities of open reaction systems are obvious. A closed system must, according to the second law of thermodynamics, eventually attain a time - independent equilibrium state, with maximum entropy and minimum free energy, where the ratio between its phases remains constant. An open system may attain a time-independent state where the system remains constant as a whole and in its phases, though there is a continuous flow of the component materials; this is called a steady state. D. Katz and R. L. Kahn in 1966 defined the following "Common Characteristics of Open Systems":

1. Importation of energy from external environment
2. The through-put transformation of energy
3. The output of product to the environment
4. Systems as Cycles of Events - pattern of activities
5. Negative entropy to arrest the entropic process
6. Information input, negative feedback, and the coding process
7. The steady state and dynamic homeostasis
8. Differentiation of global patterns by specialized functions
9. Equifinality

Functionalism is a term applied to the theory of systems which emphasizes the purposefulness of systems design. Idealization is a trait of functionalist thinking and man is the only ideal - seeking animal, therefore, purposeful systems are man oriented systems. R. Ackoff is a leading exponent of the functionalist approach and in "On Purposeful Systems" the point is made that science can be used as a way to study human behavior to achieve a purposeful state. A process is involved in pursuing purpose and the equation p: f (attitudes, beliefs, values) is expressed, where p is a purpose. The functionalist approach is basically American and is pragmatic in nature.

A more analytic approach to systems theory is the structuralist thought where it is stressed that systems can be dissected, understood and reassembled to achieve a total understanding of the system. This is an engineering styled approach but is humanistic in nature versus being analytic in the Frederick Taylor sense of engineering analysis. The structuralists are predominantly French and the thrust of systems thinking centers on city planning.

C. West Churchman presents "The Systems Approach" which is a holistic styled systems theory. The systems approach is a softer and less rigorous approach to the newer systems theories than either functionalism or structuralism and places emphasis on human values and human behavior. In this emphasis on values and behavior, Churchman considers very seriously the role of the anti-planner, who, as a humanist, regrets the design of a plan or a system by the planner or behavioral scientist for other people who have not participated, either willingly or unwillingly in the design

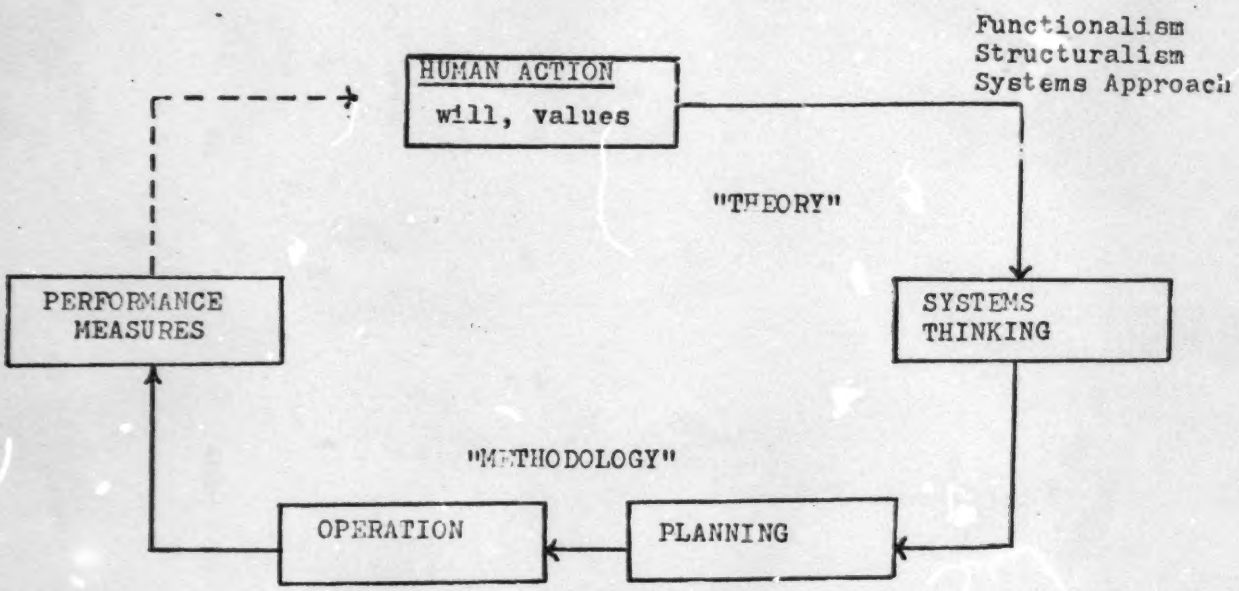
of the system affecting them. This is the holistics of the approach.

Systems thinking may be considered as a separate theory of systems which includes program budgeting and management information systems, but to return to the philosophical perceptions of reality, these poorly defined systems theories are more important when considered as only segments of the whole and not as subsets necessarily distinct one from the other. Applying systemic thought to the matter of systems thinking, there is really no distinct difference in these various theories. The importance is in the understanding of life as a total concept and that the environment is an integral part of each system and that man as a single entity or group system has a purpose which needs to be fulfilled.

III - Progression from Theory to Methodology

Having made a statement regarding the philosophy of systems and systems thinking and then considered some of the systems theories, a progression is made to methodology and implementation of the synthesized theories. The philosophy of a theory is essential to an understanding of the theory and in this instance of systems thinking it is crucial to comprehend the synthesis of the variety of theories. There is a variety because of the embryonic state of the theory. Emphasis here is on a single theory in spite of the various theories because it is timely that a theory evolve from the current thought of systems thinking. An understandable theory may evolve when progression is made from theory to methodology and a set of recognized and recognizable principles emerge from the methodology.

The following paradigm may be helpful in explaining what is meant by progression from theory to methodology:



The perception of reality of the activity of humans as single entities and in groups is theorized to be beneficial when considered in a systemic manner and the variety of theories when synthesized evolve to a mode of systems thinking. However theory is sterile without methodology; therefore a progression to the application of systems thinking to the planning process, which then is operationalized, is desirable. Conversely methodology is useless without theory and is invalid without a measure of performance. In the paradigm, an incomplete linkage moves from the performance measures to complete the cycle of return to human actions. Hopefully the progression from philosophy to theory to methodology will be complete and successful when the performance measures revise the values structure of human beings. The paradigm has an incomplete linkage because the impact and benefits of the theory are yet to be proven. This incomplete cycle reflects the infancy of systems thinking; those who believe in the theory must be excited regarding methodology.

IV - A Case Study Opportunity

A unique opportunity became available to apply and evaluate the impact of systemic studies on organization management when the researcher was asked to be an agent for change in a public school district. This is a complex public organization operating in a current turbulent environment and the policy makers (the School District Board of Directors) recognized the need for a newer and different approach to organizational management and decision making which would be more beneficial to society. A change was to take place over time and the evolutionary effect on the human elements of the organization were to be desirable and self-fulfilling. An examination of this longitudinal effort is considered to be an unusual opportunity to describe in detail the successes and failures in a real world setting of this effort to make a change following the philosophies and theories of systems thinking. A contribution can be made to the field of social systems science by describing the elements of software conceived and developed to hardware stages and to describe the scenario as it was developed by the planners. This descriptive research, with proper evaluation by performance measures, can be a useful prescriptive instrument.

The Board of School Directors of the organization being studied is an elected body of nine individuals from the community. Each school director has a particular perception of situations and perceives education in a unique manner. Collectively as a board, these same individuals have a responsibility for the continuing health of the school district as an organization and the welfare and dignity of the human beings functioning as parts and subsets of the whole organization.

Similarly the Superintendent of schools, as the chief executive officer, has a perception of the reality of the situation and aided by his direct associates (two assistant superintenderts) has a responsibility for interpreting and fulfilling the policies set by the school directors. These top managers are bounded not only by the policies of the school board but are also obligated to be in compliance with federal and state laws governing public institutions and also must remain informed and be in compliance with state regulations pertaining to public education. These executives must perform, as knowledgeable managers with the same rights, privileges, and obligations of all recognized organizational leaders, but are constrained by the laws, regulations and policies as described. There is opportunity for latitude in directing and guiding the institution and in formulating a plan or an approach to resolving the problems as perceived, but within certain distinctly defined (and other undefined) boundaries.

Also, the subsets of the organization have individual perceptions of the problems. The administrators of the separate schools comprising the school district (Principals, Assistant Principals, and Coordinators) are trained to accomplish certain functions and as educators have a parochial approach to their responsibilities. The teaching staff naturally relate most appropriately to the main purpose of the organization, which is to educate

children, because they interface directly with the students, and this subset of the organization has another perception of the current crisis. The pros and cons of each perception can be debated, however that is not the purpose of this research effort; the important fact to recognize is that there are a variety of perceptions of the reality of the current crisis. Other subsets of the organization, such as secretarial staff, custodians, maintenance workers, bus drivers and cafeteria workers, also have expectations and are integral parts of the whole.

It is considered timely to consider a fresh approach; such a fresh and constructive approach may exist in the systemic appraisal of the realities and potentials of the patterns of educational organization and decision making plus the possibility of functioning as an open system. In this sense the system, usually designated as any aggregate of elements considered together with the relationships holding among them, is here used to connote a holistic system; in using this term, the elements are abstracted and reference is to the organization of the whole. In this context, the members of the system are, from the holistic viewpoint, not significantly connected with each other except with reference to the whole. What is expressed is that the whole is more than the sum of the parts, the system is an independent framework in which the parts are placed. The

greater the organization of the whole, the more the inherent properties of parts are utilized as codeterminants of positional values.

It was the considered judgment of the change agents - the Superintendent of Schools and the two Assistant Superintendents - that resistance to change would preclude a statement of an idealized system design and a stated scenario. (This decision will be evaluated in the research). The possibility of the dynamic action of such a system change would propably be questioned a priori by the community, the school directors and the administrators. Although causality is just as inexplicable as a system action, many decision-makers, because of their training and experience, feel more comfortable with giving credit to the formulation of the dynamics of a given happening in terms of causality than to its formulation in terms of systemic action. For this reason, it is considered preferable to approach the solution to the situation in a systematic way which would fit into the context of the norm and to progress to the ultimate solution with subtlety allowing an evolutionary process to take place. The significant element here is the evolutionary process. This research proposes to integrate the effort of the stakeholders - school directors, administrators, staff and community - in an acceptable, but different approach to striving toward a steady state (versus striving to maintain an equilibrium) for the organization in a turbulent period.

The research is intended to be descriptive in nature with hypotheses and evaluations which can be descriptive for other similar organizations.

The consideration of values is an essential part of the systems approach to organizational and human behavior. Feedback is necessary to evaluate progress, and correct information provides feedback, therefore this research effort involves the formulation of an information system to support the systems approach to resolving the problem. The instrumental value of an improved plan for planning and an improved information system hopefully is improved decision-making by stakeholders constructively using the output of the system; however, considered of greater importance is the intrinsic process values derived from the planning, designing and developing which requires the involvement of the stakeholders. This valuing process should inculcate a behavioral pattern of decision-making with a greater degree of confidence of expectations because the decision is a product of better analysis, which should in turn result in better performance of the organization and the stakeholder can be more satisfied with his/her effort.

V - Systems Thinking Applied to Participative Planning

Organizational structures need a body of responsible and responsive managers to maintain and guide the direction of the enterprise. It is probably an exaggeration to say that recent developments in educational administration constitute a revolution, but it is no exaggeration to say that the last decade or two have witnessed profound changes which seem to forecast more extensive developments in the near future. Much of the "new" in educational administration involves new knowledge which leads to new insights into administrative behavior with consequent hope for increasing the professional capability of school district administrators to meet the challenges that lie ahead. To understand some of whatever it is that is being described as "new" in educational administration, there are four beliefs to which the adherents of the "new" would tend to describe:

1. administration is comprised of specialized skills, knowledge, and understandings which are different from the activities being administered.
2. the practice of administration, in the new sense, is based on a realistic view of organizations as they actually exist.
3. the scientific foundations of the new administration are in the behavioral sciences.

4. change is inevitable in educational administration, and innovation is urgently needed. *

Trist and Emery state that a comprehensive understanding of organizational behavior requires some knowledge of each member of the following set, where L indicates some potentially lawful connection, and the suffix 1 refers to the organization and suffix 2 to the environment:

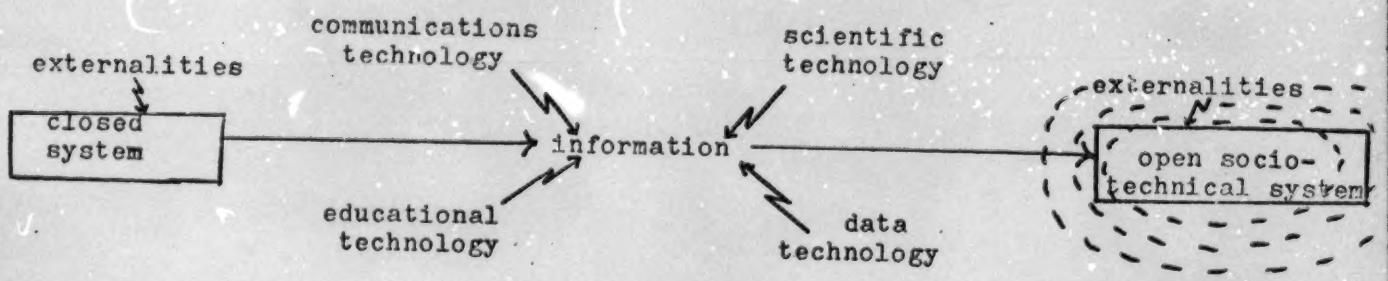
$$L_{11}, L_{12}$$
$$L_{21}, L_{22}$$

L_{11} here refers to processes within the organization - the area of internal interdependencies; L_{12} and L_{21} to exchange between the organization and its environment - the area of transactional interdependencies, from either direction; and L_{22} to processes through which parts of the environment become related to each other - the area of interdependencies that belong within the environment itself. The causal organization texture described here relates to that of a "Turbulent Fields Environment" - dynamic processes, which create significant variances for the component organizations, arise from the field itself. What becomes precarious under turbulent fields environmental conditions is how organizational stability can be achieved. The perspective of these four environmental types represent a trend in value change. The

* Robert G. Owens, "Organizational Behavior in Schools"

establishment of a new set of values is a slow social process requiring something like a generation - unless new means can be developed. *

The technological component has been found to play a mediating role and hence it follows that the open system concept must be referred to the socio-technical system, not simply to the social system of an enterprise. ** The primary task in managing the enterprise as a whole is to relate the total system to its environment and is not in internal regulations, per se. The following paradigm may help to illustrate the progression and distinction of a closed and an open system:



reactive planning mode

active planning mode

interactive planning mode

In the Closed system of operating a public school organization the enterprise allows externalities to impact on it and there is a

* F. E. Emery and E. L. Trist, "The Causal Texture of Organizational Environments"

** F. E. Emery and E. L. Trist - "Socio-technical Systems"

continuing emphasis on a reactive planning mode. With the benefit of newer technologies in communications, science, education, and data processing the closed operational system can move in the direction of an open socio-technical system which allows for more responsiveness to externalities and with improved information and feedback can progress through an active planning mode to an interactive planning mode. This evolutionary change then allows the organization to have some beneficial plan for making things happen that improve the educational process and is responsive in a positive way and can influence the internal and external environment.

The recognition of the need for change originated in the organization which is the subject of this research with the Board of School Directors. They observed the continuity of the preferred educational program, but the cost and mode of operation were tending to be uncontrollable and dysfunctional. An entirely new top management team (Superintendent and two assistant superintendents) adopted a participative style of management and with the approval of the school directors embarked on a six months review and study of operating conditions. The report of this study made certain specific recommendations but the primary con-clusion was that the organization was disjointed, lacking direction, and motivated primarily by the environment - internal and external. A plan for planning was proposed and approved which was classified as a continuous

program for long-range, short-range and financial organizational planning. This planningprogram was the second significant operational change, the first being the intent of the Board and top management to move toward a participative management style. Two additionally significant needs were recognized; one being to correct the lack of meaningful - accurate and timely - information to provide feedback on educational and financial operations, and the other need being to improve and develop the management skills of the organization's administrators.

The strategy to change (1) the management style to a more participative one, (2) the planning function to give some direction to the organization, (3) the information flow to allow for negative feedback, and (4) the personal development of knowledgeable administrators led to the agreement to utilize the development of an integrated information system to move toward the achievement of these desired ends. The tactic of developing an information system derived from the need for an information system and the unavailability of such a system. It was recognized that the desired strategic changes could be accomplished in this single, long term project, and thus a longitudinal research project was available for documentation and study. Since personal performance, human behavior and attitudinal changes are all involved in such an effort, it was considered desirable to progress in as normal a manner as

possible in order to avoid a "Hawthorne Effect" on the observations and results which would destroy objectivity, thus a synthesis of systems thinking evolved in a functional way.

The developing of the strategy covered a one year span and the tactical development of an information system covered a two year time span. The initial step of the information system planning began with the involvement of all of the school district's administrators in a work shop which recommended a six month feasibility study. This study was conducted with the involvement of all administrators and certain staff members serving on one of seven project teams to study all operational functions of the school district. This effort was followed by the design of an innovative data based information system over the next six months and an additional year was spent in developmental work and implementation.

IV - Realities of Operational and Environmental Conditions

Various conflicts arise during the time span of a longitudinal research effort and these conflicts are serious constraints on the progress of introducing a program of the scope described. To describe the specificities of a systemic approach to organizational change and human behavior and to further attempt to articulate the design, development and implementation of a data based information system a priori to the effort is considered inappropriate, if not impossible. Although idealization is recognized as being beneficial, if not absolutely necessary, to the systemic approach, the decision was made at the beginning of this effort to allow staff involvement and creativity to operate during the feasibility study for an information system. However it is necessary to have an idealized program and to develop a scenario at least with the top management team and this is the approach taken in this research. As described earlier, the top management team agreed, after study, to concentrate on the following four phases of the systemic study and to allow patterns of change to evolve from the process:

- revise the style of management to a more participative one
- change the planning function to give some direction to the organization
- provide an information flow to allow for negative feedback

- provide for the personal development of knowledgeable administrators

As described earlier, the turbulent nature of the environment makes these changes desirable and the research beneficial, but at the same time presents a series of problems for the stakeholders. The members of the community are the source of approximately 90 percent of the money resources for the school district and inflation has had a serious impact. The three communities of the district are heterogeneous; one is affluent, one is middle income and one is in a defined poverty area, therefore the community demands reduced taxes and suggested changes are suspect and there is a reluctance to innovate. However there is a recognized quality of education which continues to be demanded. The community is supportive of the school system, but demands continuing quality education at less cost to the taxpayers. A program of community relations is necessary to maintain support during this period of evolutionary change.

Also the turbulent environment has shifted the board membership during the period of change. Within the first six months, four new members joined the board as a result of death, transfer and election; then in the next two years four other new members joined the board, which means only one school director remained during the three

year longitudinal study. The newer members entered a period of learning and they also came to the board with certain individual expectations which were at variance with the direction of the systemic change program.

Staff members, both professional and non-professional, have individual and collective expectations and innovative change, particularly in the area of operations, is not readily accepted. The public school system is for probably valid reasons insulated somewhat from the environment in that there is a high level of security of position. Tenure laws guarantee security for professional staff and legal requirements for constantly increasing compensation for employment make inertia a negative factor.

Although the contemplated changes are operational in nature and the educational process is to be maintained, the pupil population and their values must be considered. The staff and pupils are rated as above average on a national scale and they expect to achieve in the various areas of education - classroom grades, test scores, music programs, athletics, etc.

The political realities of the situation are important. In addition to the natural fears and anxieties associated with change is the conservation nature of some individuals to resist change of any kind. A basic conservatism, or risk aversion, is associated with the public

sector; as discussed, personal security is a serious element of the stakeholders within the environment and some without. School directors achieve their position as a result of the political election system; successful candidates have had to take a position publicly. In this turbulent time, school directors are elected on emotional responses and then have an expectancy to fulfill, at least verbally, their political statements. This can and does get in the way of rational thinking and is an impediment to innovativeness; change things, but don't rock the boat, and a conflict exists.

Collective bargaining in the public sector is relatively new. At this particular time of economic inflation, when an innovative approach to management is introduced, the advent of collective bargaining adds a barrier to success. Not that collective bargaining per se is negative socially, or even related directly to the systems approach to organizational change, but holistically this strain on management/labor relations presents an additional conflict. This conflict is further compounded when the board and the administrators are also in dispute over salaries and benefits.

Also the introduction of a new technology - information system - has linguistic problems. To the best of our knowledge (and a search was made) a data based integrated information system is not available in public

education in the United States. Such systems do exist in the private sector, but none can be found for public school districts. The highly skilled computer technician must interface with the knowledgeable administrator. This is accomplished following the guidelines of R. Ackoff with the introduction of the management scientist (the researcher). The conflict of terminology, emphasis of effort, and use of data/information must be overcome.

Importance of Research:-

The research proposed has been justified on the basis of the prevailing environmental changes both external and internal to the organization and the search for change which will have societal benefites. Is there a better way to manage public schools and can the human resources indogenous and exogenous to the institute be utilized and satisfied? There are recognized conflicts which have been elicited; there are inevitably other unforeseen conflicts, especially in the present turbulent state.

Values are a vital element of the research. The anticipated outcome values are indicated and certain current values of the subsets of the organization have been explained. However the most important aspect of this research is the process values derived over time which, if valid, will have long standing benefit to the organization and, more important, to the individuals in each of the subsets of the organization.

In terms of human values, there must be a sense of justice, equity, and fairness among the stakeholders and there must be an honest respect for each person as an individual. These intrinsic values can be sufficient rewards but also necessary is the prohibition against deliberately inflicting pain - physical or psychological. If organizational values are to be fulfilled then functions,

activities and structures must be formulated and implemented; the means to such ends are the programs, policies, processes, procedures and practices explained as the process for this research.

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